

IN THE SPECIFICATION

On page 3, line 5, replace the entire paragraph with the paragraph below, which shows the changes made.

- 5           1.       The home network if it is ~~its~~-available (based on MCC and MNC from IMSI);

10           On page 4, lines 3-12, replace the entire paragraph with the paragraph below, which shows the changes made.

15           Some operators also own networks in various countries. These operators would like to make sure their out-roamers stay within the group properties, or stay on preferred networks, in order to gain the best service experience even when roaming. They will also be able to offer geography based price plans (for example, a single rate all across Western Europe or South East Asia) to users who have subscribed to such plans. In addition, as new technologies keep rolling out, operators ~~they~~ can control the rollout schedule across their own properties and also make sure interoperability issues are taken care of. Keeping roaming subscribers on preferred networks gives the best service experience to the subscriber. However, current methods of controlling which network a subscriber registers on when roaming have disadvantages.

25           On page 7, lines 1-12, replace the entire paragraph with the paragraph below, which shows the changes made.

30           Registration rejection methods include the following components: detecting the network the roamer is currently on; the TR application logic deciding whether the registration process should be allowed to succeed or should be rejected; if the network is to be rejected, various approaches are taken to reject the Update Location with various

error codes or to send a subscriber profile with information that makes the handset search for a new network; if a preferred network is not found, the TR application logic can decide that the user should be provided service on any available network, and hence registrations on non-preferred networks are also allowed to go through; a mechanism to  
5 initiate Update Location on demand is also provided, and this can be used to make the handset trigger an Update Location periodically; in some embodiments, it is determined whether the handset is in manual or automatic network selection mode; and it is also determined whether the handset is in the midst of a voice or GPRS/MMS session.

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On page 7, lines 13-16, replace the entire paragraph with the paragraph below, which shows the changes made.

Both the OTA approaches and the registration rejection approaches involve first  
15 detecting that the subscriber is roaming in another network. The two types of approaches ~~approached~~ also share various databases (to be described below) of information that are ~~is~~ ~~be~~-used to make traffic redirection decisions.

20 On page 7, lines 17-25, replace the entire paragraph with the paragraph below, which shows the changes made.

**Figure 1** is a block diagram of one embodiment of a traffic redirection system 100. The system 100 includes network operator backend processes (or “backend”) 101,  
25 external systems 126, and traffic redirection network (TR) element 102. These elements are used by the network operator to provide wireless services to subscribers, such as cellular phone users. Subscribers or users buy services from the operator, including voice and data services that the user can access with a phone, a PDA, a PC, or any device (not shown in this figure) that can communicate on a wireless network. The user device is  
30 generically referred to as a mobile station in the wireless network. For convenience herein, the mobile station will usually be referred to as a handset.

On page 8, lines 5-6, replace the entire paragraph with the paragraph below, which shows the changes made.

5

The network operator backend 101 further includes an integration interface 124 for facilitating communication with other systems.

10 On page 10, lines 12-18, replace the entire paragraph with the paragraph below, which shows the changes made.

Another alternative is configuring the operator GMSC/STP 304 to send all the E.214 messages to the HLR 302. However, in response to the ~~to the~~ Insert Subscriber  
15 Data message, if the Called Party Address is outside the operator's numbering plan and the Called SSN is a VLR 312 SSN (SSN=7), the messages are routed via the TR network element 102. This achieves the same result as the second alternative listed above but limits the number of messages that go via the TR network element 102 since only messages meant for external networks need to be handled.

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On page 11, lines 2-9, replace the entire paragraph with the paragraph below, which shows the changes made.

25 The network operator may chose to use various data elements in order to selectively redirect registration traffic. For example, pre-paid users may need to be redirected to a specific network while post-paid users are be redirected to another preferred network in the same country and coverage area. Even within these segments, the operator may have business rules to determine if the roamer is a GPRS/MMS  
30 subscriber or just a voice call user. Based on such service profile information, further

preference for networks can be established. Some of the database entities that are contemplated for embodiments envisaged by this patent application are listed below.

5           On page 11, lines 28-31, replace the entire paragraph with the paragraph below, which shows the changes made.

          A Roaming Partners Tariff database includes tariff information and also typically contains typically also contain information regarding whether the roaming partner is part  
10 of a global or geographical tariff plan, whether charges are incurred per minute, or per second, or per six seconds, whether there is a minimum charge, etc.

          On page 12, lines 23-26, replace the entire paragraph with the paragraph below,  
15 which shows the changes made.

**Figure 5** is a diagram that ~~helps~~ illustrates embodiments of OTA traffic redirection. In Figure 5, the subscriber 202 is away from the home network, HPLMN 212. Several networks are available for the subscriber 202 to roam on, including  
20 VPLMN 504, VPLMN 506, and VPLMN 508.

          On page 13, lines 18-19, replace the entire paragraph with the paragraph below, which shows the changes made.  
25

          Location Status – contains the current service state of the Mobile Station;  
Location Status can ~~Can~~ have values including Normal Service, Limited Service or No Service;  
30

On page 14, lines 3-4, replace the entire paragraph with the paragraph below, which shows the changes made.

**Figure 6** is a flow diagram of an embodiment of OTA traffic redirection, which  
5 will now be described with reference to Figures 5 and 6. ~~Figure 5 and 6~~,

On page 16, lines 1-11, replace the entire paragraph with the paragraph below, which shows the changes made.

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Redirection includes using the OTA server 112 ~~is to~~ update certain SIM card files. As shown at 624, the SIM files are updated to reduce an HPLMN search timer period in  $EF_{HPLMN}$  from a default value to a value "01" as specified in ETSI GSM 11.11. This specifies that the mobile station will search for the HPMN after 6 minutes. If the  
15 redirection attempt is not successful (within next 6 + delta minutes), redirection will be re-attempted for a configurable number of times. If the attempt is still not successful or if the mobile station switched to the preferred network, the search period specified in  $EF_{HPLMN}$  will be restored to the default value at the discretion of the HPMN. This search time reduction may be required on some handsets to trigger a search for the HPLMN and  
20 in the process force an Update Location procedure as defined in ETSI GSM 2.11, 4.08, 3.22 and 3G TS 23.122.

On page 18, lines 25-27, replace the entire paragraph with the paragraph below,  
25 which shows the changes made.

Each of the processes described above can be performed using passive monitoring or by being in the signaling path (active monitoring). The TR node 102b uses a valid Global Title and Point Code to inject these messages into the SS7 network 306.

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On page 18, line 28-page 19, line 6, replace the entire paragraph with the paragraph below, which shows the changes made.

The handset 204 tries the Update Location on the same network a few more times.  
5 This attempt count is equal to the value of the ATTEMPT COUNTER (recommended as 4 in GSM specifications). If there are as many consecutive failures, the handset 204 searches for a new PLMN. In effect, it goes to the box marked as TR1 in **Figure 7** (Automatic network selection mode) or the box marked as TR2 in **Figure 8** (Manual network selection mode). **Figures 7 and 8** are diagrams showing an ~~and~~ automatic  
10 network selection process and a manual network selection process, respectively, per ~~per~~ the specification 3G TS 23.122 Version 3.1.0 Release 199 (ETSI TS 123 122 V3.1.0 2000-01). As referred to herein, **Figures 7 and 8** show how various embodiments interact with the specified processes.

15  
On page 19, lines 12-17, replace the entire paragraph with the paragraph below, which shows the changes made.

The TR application 102c checks its database information and decides if a traffic  
20 redirection has to be attempted. For example, if the roamer has registered on a non-preferred VPMN, the traffic redirection application may decide to perform some actions. Other, more specific logic can also be programmed to identify a candidate for traffic redirection. For example, preferred networks for pre-paid and post-paid users, or for GPRS and non-GPRS users may each differently influence ~~be different influencing~~  
25 whether to redirect.

On page 19, lines 18-26, replace the entire paragraph with the paragraph below, which shows the changes made.

The traffic redirection application rejects the “first round” of Location Updates and thereby forces ~~force~~ the handset to search for the next available PLMN (in automatic roaming network selection mode) or try the same PLMN after a brief delay (in manual roaming network selection mode, or if only one network is available in automatic

5 roaming mode). The “first round” of Update Location is “rejected” by jamming the transaction. In one embodiment, jamming the transaction involves sending a spurious MAP End Update Location message with a configurable user error. In one embodiment, the user error is one of System Failure (local value 34), Data Missing (local value 35) or Unexpected Data Value (local value 36).

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On page 19, line 27-page 20, line 5, replace the entire paragraph with the paragraph below, which shows the changes made.

15 Other possible values include Unknown Subscriber (local value 1), and Roaming Not Allowed (local value 8). These values, however, can cause various significant events. For example, Unknown subscriber translates to “IMSI not known in HLR” on the radio interface and this marks the SIM as an invalid SIM. The handset stops further PLMN search unless the SIM is removed and reinserted or the handset is powered off and

20 on. “Roaming Not Allowed” puts the PLMN in the Forbidden PLMN file (EF<sub>FPLMN</sub>) in non-volatile memory on the SIM card and the network cannot be selected unless removed by an OTA operation, STK application, or manual network selection. This value is probably not useful unless the partner network in VPMN country has national coverage or there is a roaming relationship with at least ~~at least~~ three operators in the visited

25 country.

On page 28, lines 1-17, replace the entire paragraph with the paragraph below, which shows the changes made.

30

In one embodiment the mechanism of doing this includes selective redirection. The TR network entity stays in the SS7 signaling path 1114 and manipulates ~~manipulate~~ the Update Location transaction. Again with reference to **Figure 11**, the mobile subscriber 1102 is roaming in VPLMN 1108, and initiates the registration process on the network. The Update Location message is routed from the VPLMN 1108 to HPLMN 1112 where the message is routed via the TR network element 102 to the HLR 1302. The HLR 1302 sends the subscriber profile to the VLR 1312 using the Insert Subscriber Data message. This message is routed via the TR network element 102. TR network element 102 modifies the Subscriber Status in the message to “Operator Determined Barring”. This allows the mobile station 1104 to register, but does not allow the subscriber 1102 to make or receive any calls. Immediately afterwards the TR network element 102 sends a MAP Provide Subscriber Information message to the VLR 1312. The VLR 1312 returns the cell-id of the mobile station 1104 gathered during the Update Location Area transaction. Based on this cell-id information, the HPLMN 1112 may decide if it wants the roamer to register on this network (for example, when HPLMN 1112 does ~~1112 does~~ not offer service in that specific region) or search for another network (for example, if the roamer is in or close to an area where the HPLMN 1112 also offers service).